

TOPIC 2.

FUNDAMENTALS OF COMPUTER OPERATIONS

Computer operations refers to the basic activities a Computer performs to receive data, process it, store it, and produce output.

The operations are coordinated by the Central Processing unit (CPU) and controlled by the operating system (OS).

a) Input

This is the process of entering data or instructions into a Computer.

Devices used for input include:

Keyboard

Mouse

Scanner

Microphone

Camera

Touchscreen.

- Input converts human-readable data into Machine-readable form.

b) Processing

Processing is the operation where the Computer manipulates, calculates, or transforms data into meaningful information.

- processing is performed by the CPU, made up of:

- ALU (Arithmetic and Logic unit): performs Calculations and Logical Comparisons.
- CU (Control unit): Directs and Coordinates operations inside the Computer.
- Registers: High-Speed temporary storage inside CPU.

1. Examples of processing:

- Calculating totals.
- Sorting data.
- Comparing values.
- Running applications.

c) Output.

Output involves presenting processed information to the user in a readable form.

Output devices include:

- Monitor / screen.
- Printer
- Speakers.
- Projectors.

Outputs may be text, images, sound or video.

d) Storage.

Storage refers to saving data and information for future use.

There are two main types:

1. Primary Storage (Main memory).

- RAM (Random Access Memory): Temporary; data lost when power is off.
- ROM (Read Only Memory): Permanent;

Contains essential startup instructions.

2. Secondary Storage.

- Hard disk drive (HDD)
 - Solid State drive (SSD)
 - USB Flash drive.
 - Memory Card.
 - Cloud Storage.
- Storage ensures data remains available even after power is turned off.

e) Control.

- Control Operations Manage and Co ordinate all other Computer activities. This is handled by

Introduction to Operating System (OS)

- An operating system (OS) is a system software that manages computer hardware, runs applications, and provides a user interface.
- It acts as an intermediary between the user and the hardware.

Examples: Windows, Linux, MacOS, Android, iOS.

Functions of an operating system

1. Process management
 - Controls the execution of programs.
2. Memory Management
 - Keeps track of memory usage.
3. File Management
 - Controls access to files.
4. Device Management
 - Manages input/output operations.

5. Manag. Security and protection.
 - Protects data from unauthorized access.
6. User interface Management.
 - Offers a way for users to interact with the system.

Types of Operating Systems.

1. Single-user, Single-Task.

- Allows one user and one task at a time.
- Example: Older Mobile OS versions.

2. Single-user, Multi-Tasking.

- One user can run multiple tasks.
- Examples: Windows, MacOS.

~~3. Multi-user OS.~~

- ~~One~~^{many} users can run multiple tasks.

3. Multi-user OS.

Many users can use the system at the same time.

Example: LINUX, Linux.

4. Real-Time Operating System (RTOS).

- Designed for systems requiring immediate response.
- Used in medical devices, robots, aircraft systems.

5. Distributed Operating System.

- Controls a group of separate computers as one system.
- Used in clusters and grids.

6. Embedded Operating System.

- Built into devices such as TVs, Microwaves and ATMs.
- Example: Android Wear, iOS embedded versions.

Components of an Operating System.

1. Kernel.

- The core part of the OS.
- Manages CPU, memory, and devices.
- Runs at the lowest level.

2. Shell.

- Interface between user and OS.
- Can be GUI (Windows, MacOS) or CLI (Linux terminal).

3. File System.

- Organizes data and manages how files are stored and retrieved.

4. Device Drivers.

Programs that allow the OS to communicate with hardware.

BOOTING PROCESS

Booting is the process of starting up the computer.

Types of booting.

1. Cold Booting: Starting the computer when it is completely off.

Restarting a computer that

is already on.

Steps in booting:

- i) Power is turned on.
- ii) BIOS / UEFI runs POST (Power-On self test).
- iii) OS is loaded into RAM.
- iv) User interface appears.

Computer Operations Cycle

The CPU performs operations in a Continuous Cycle called the Fetch-Decode-Execute Cycle:

1. Fetch: Retrieve instruction from Memory.

2. Decode: Interpret the instruction. (calculations, move data, etc.)

3. Execute: perform the instruction. (calculations, move data, etc.)

- This cycle happens millions or billions of times per second.